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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/748,308	12/29/2003	Seok-Jun Won	9898-304	7991

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EXAMINER

NGUYEN, THINH T

ART UNIT PAPER NUMBER

2818

DATE MAILED: 05/12/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/748,308

Applicant(s)

WON ET AL.

Examiner

Thinh T. Nguyen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12/29/2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-22 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 December 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED OFFICE ACTION

Specification

1. The specification has been checked to the extent necessary to determine the presence of all possible minor errors. However, the applicant cooperation is requested in correcting any errors of which the applicant may become aware in the specification.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102(b/e) that form the basis for the rejections under this section made in this office action.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

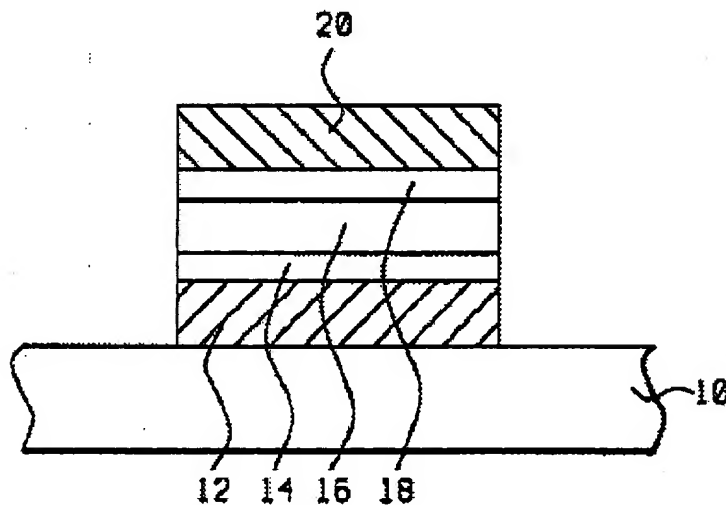
3. Claim 1-4 ,6-16, 20,22 are rejected under 35 U.S.C. 102(e) as being anticipated by Shih et al. (U.S. Patent Application Publication US 2003/0096473).

REGARDING CLAIM 1,8

Shih et al. (the title, the abstract, fig 4, paragraph [0022] , paragraph [0023] , paragraph [0024]) disclose a capacitor of a semiconductor device comprising: a capacitor lower electrode

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(fig 4 layer 12) disposed a semiconductor substrate; a first dielectric layer (fig 4 layer 14) comprising aluminum oxide disposed on the capacitor lower electrode; a second dielectric layer (fig 4 layer 16) comprising a material having a higher dielectric constant than that of aluminum oxide disposed on the first dielectric layer; a third dielectric layer (fig 4 layer 18) comprising aluminum oxide disposed on the second dielectric layer; and a capacitor upper electrode disposed (fig 4 layer 20) on the third dielectric layer and a method for manufacturing a capacitor of a semiconductor device, the method comprising: forming a capacitor lower electrode on a semiconductor substrate; forming a first dielectric layer comprising aluminum oxide on the capacitor lower electrode; forming a second dielectric layer comprising a material having a higher dielectric constant than aluminum oxide on the first dielectric layer; forming a third dielectric layer comprising aluminum oxide on the second dielectric layer; and forming a capacitor upper electrode on the third dielectric layer.

*FIG. 4*

REGARDING CLAIM 2,3,9,10

Shih discloses in paragraph [0023] the use of Tantalum Pentoxide (Ta_2O_5) and Hafnium Oxide (HfO_2) and these oxide are inherently high-k material with k greater than 20, as disclose by Perng et al (US patent Application Publication 2004/0067657) paragraph [0004].

REGARDING CLAIM 4,6,11,12

Shih discloses in paragraphs [0022], [0023], [0024] ,that the high-k layer have a thickness of 50 to 800 angstroms and the aluminum oxide layers have a thickness of 10 to 50 angstroms therefore fully anticipates claims 4,6,11,12

REGARDING CLAIM 7,20,22

Shih discloses in paragraphs [0022],[0025] the formation of Titanium Nitride electrodes using Physical Vapor Deposition (PVD) or ALCVD .

REGARDING CLAIM 13,14,15

Shih discloses (in claim 20 in paragraph [0023] line 12), a thermal treatment (annealing) in an atmosphere that have plasma oxygen.

REGARDING CLAIM 16

Shih discloses (in claim 20) the temperature of the thermal treatment is at a temperature from about 300 to 700 degree Celsius therefore fully anticipates claim 16.

Claim Rejections - 35 USC § 103

4. The following is a quotation of U.S.C. 103(a) which form the basis for all obviousness rejections set forth in this office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 5,17-19,21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shih et al. (U.S. Patent Application Publication US 2003/0096473) in view of further remark.

REGARDING CLAIM 5,17

Shih discloses (in claim 12) discloses all the invention except that the thickness of the Aluminum Oxide layer is in the range of 10 to 50 angstroms instead of 30 to 300 angstroms. However, it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum values or workable range involves only routine skill in the art.

REGARDING CLAIM 18,19

Shih discloses in paragraph [0022] the use of Atomic Layer Chemical Vapor Deposition Without going into detail about using the ALD to form the Aluminum Oxide using a gas include ozone or plasma oxygen without hydrogen.

This feature, however, has become known in the art as evidenced by the disclosure by Kim et al. (US patent 6,576,053) in the abstract and in fig 5.

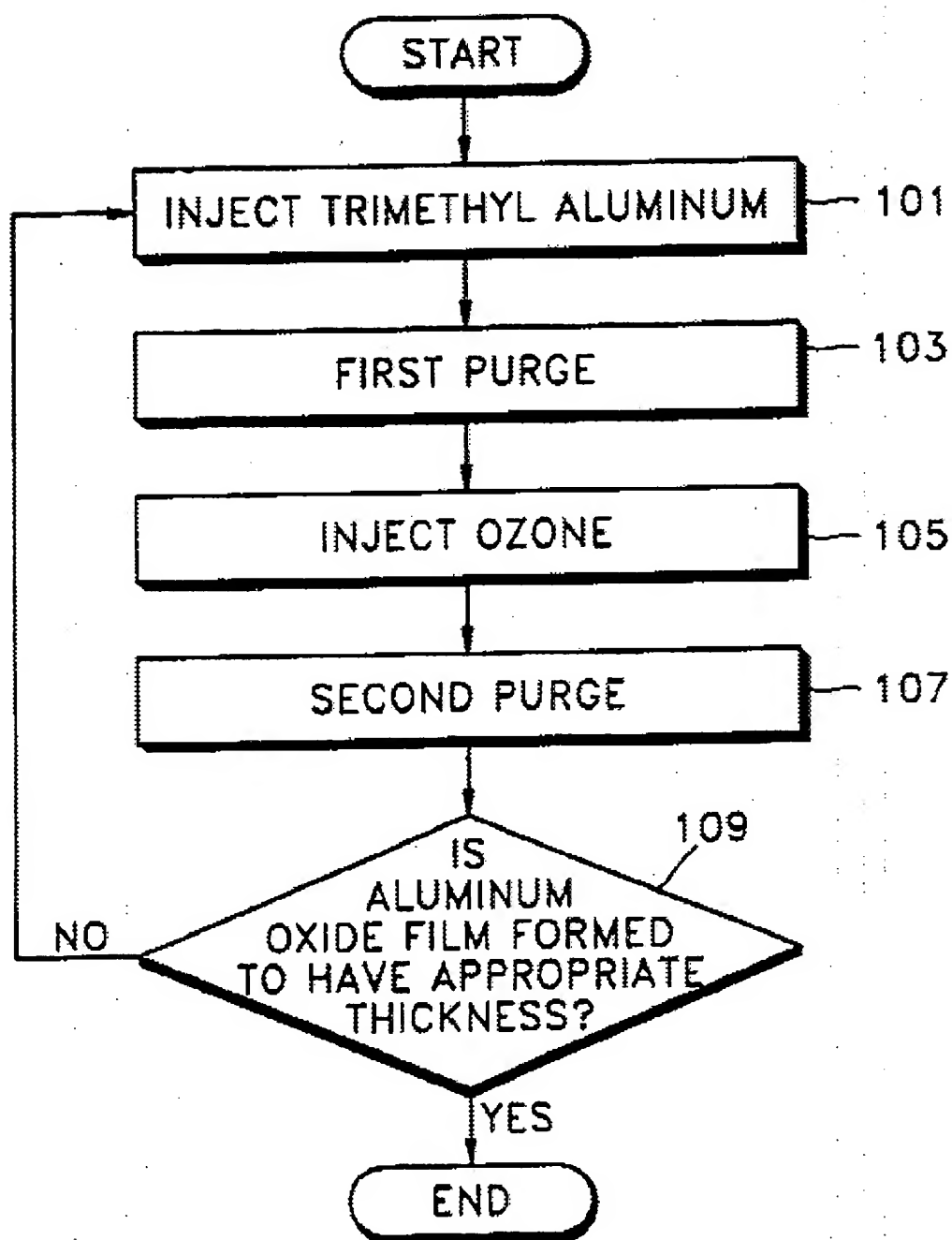
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A person skilled in the art at the time the invention was made would have been able to use this method from the teachings by Shih and his ordinary routine skill without any special teachings.

REGARDING CLAIM 21.

Shih et al. disclose all the invention except for the deposition temperature of the upper and lower electrode and the rationale why claim 21 is obvious over Shih et al. has been discussed in the rejection of claim 5,17

FIG. 5



6. When responding to the office action, Applicants are advised to provide the examiner with the line numbers and the page numbers in the application and/or references cited to assist the examiner to locate the appropriate paragraphs.

7. A shortened statutory period for response to this action is set to expire 3 (three) months and 0 (zero) day from the day of this letter. Failure to respond within the period for response will cause the application to be abandoned (see M.P.E.P. 710.02(b)).

8. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d) which papers have been placed of record in the file.

CONCLUSION

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thinh T Nguyen whose telephone number is 571-272-1790.

The examiner can normally be reached on Monday-Friday 9:00am-6:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Nelms can be reached at 571-272-1787.

The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Thinh T. Nguyen



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David Nelms
Supervisory Patent Examiner
Technology Center 2800